



Marked-Up Version of Amendments Submitted In Response To
The Office Action Mailed September 10, 2002

4764. (amended) A method of treating a coal formation in situ, comprising:
providing heat from one or more ~~heat source~~heaters to at least a portion of the formation;
allowing the heat to transfer from the one or more ~~heat source~~heaters to a ~~selected~~
~~sectionpart~~ of the formation such that the heat from the one or more ~~heat source~~heaters pyrolyzes
at least some of the hydrocarbons within the ~~selected sectionpart~~ of the formation;
producing pyrolysis products from the formation;
heating at least a portion of the ~~selected sectionpart~~ of the formation to a temperature
sufficient to generate synthesis gas;
controlling a temperature of at least a portion of the ~~selected sectionpart~~ of the formation
to generate synthesis gas having a selected H₂ to CO ratio;
providing a synthesis gas generating fluid to at least the portion of the ~~selected~~
~~sectionpart of the formation~~ to generate synthesis gas; and
producing a portion of the synthesis gas from the formation.

4765. (amended) The method of claim 4764, wherein the one or more ~~heat source~~heaters
comprise at least two ~~heat source~~heaters, and wherein superposition of heat from at least the two
~~heat source~~heaters pyrolyzes at least some hydrocarbons within the ~~selected sectionpart~~ of the
formation.

4776. (amended) The method of claim 4764, further comprising allowing the heat to transfer
from the one or more ~~heat source~~heaters to the ~~selected sectionpart~~ of the formation to
substantially uniformly increase a permeability of the ~~selected sectionpart~~ of the formation.

4777. (amended) The method of claim 4764, further comprising controlling heat transfer from
the one or more ~~heat source~~heaters to produce a permeability within the ~~selected sectionpart~~ of
the formation of greater than about 100 millidarcy.

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4778. (amended) The method of claim 4764, further comprising heating at least the portion of the ~~selected section~~part of the formation when providing the synthesis gas generating fluid to inhibit temperature decrease within the ~~selected section~~part of the formation during synthesis gas generation.

4780. (amended) The method of claim 4764, wherein heating at least the portion of the ~~selected section~~part of the formation to a temperature sufficient to allow synthesis gas generation comprises:

heating zones adjacent to wellbores of one or more ~~heat source~~heaters with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the zones to temperatures sufficient to support reaction of hydrocarbon material within the zones with an oxidizing fluid;

introducing the oxidizing fluid to the zones substantially by diffusion;

allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material within the zones to produce heat in the zones; and

transferring heat from the zones to the ~~selected section~~part of the formation.

4781. (amended) The method of claim 4764, wherein heating at least the portion of the ~~selected section~~part of the formation to a temperature sufficient to allow synthesis gas generation comprises:

introducing an oxidizing fluid into the formation through a wellbore;

transporting the oxidizing fluid substantially by convection into the portion of the ~~selected section~~part of the formation, wherein the portion of the ~~selected section~~part of the formation is at a temperature sufficient to support an oxidation reaction with the oxidizing fluid; and

reacting the oxidizing fluid within the portion of the ~~selected section~~part of the formation to generate heat and raise the temperature of the portion.

4782. (amended) The method of claim 4764, wherein at least one of the one or more ~~heat source~~heaters comprises ~~one or more~~an electrical heaters ~~disposed in the formation~~.

4783. (amended) The method of claim 4764, wherein at least one of the one or more heat source heaters comprises ~~one or more~~ a natural distributed combustors.

4784. (amended) The method of claim 4764, wherein the one or more ~~heat source~~ heaters comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

4785. (amended) The method of claim 4764, wherein heating at least the portion of the ~~selected section~~ part of the formation to a temperature sufficient to allow synthesis gas generation and providing a synthesis gas generating fluid to at least the portion of the ~~selected section~~ part of the formation comprises introducing steam into the portion.

4786. (amended) The method of claim 4764, further comprising controlling the heating of at least the portion of ~~selected section~~ part of the formation and provision of the synthesis gas generating fluid to maintain a temperature within at least the portion of the ~~selected section~~ part of the formation above the temperature sufficient to generate synthesis gas.

4789. (amended) The method of claim 4764, wherein the synthesis gas generating fluid comprises water and carbon dioxide, wherein the carbon dioxide inhibits production of carbon dioxide from the ~~selected section~~ part of the formation.

4793. (amended) The method of claim 4764, wherein providing the synthesis gas generating fluid to at least the portion of the ~~selected section~~ part of the formation comprises raising a water table of the formation to allow water to flow into ~~the~~ at least the portion of the ~~selected section~~ part of the formation.

4794. (amended) The method of claim 4764, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a portion of the hydrocarbons are subjected to a reaction within at least the portion of the ~~selected section~~ part of the formation to increase a H₂ concentration within the produced synthesis gas.

4795. (amended) The method of claim 4764, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react within at least the portion of the ~~selected section~~part of the formation to increase an energy content of the produced synthesis gas.

4799. (amended) The method of claim 4764, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more ~~heat source~~heaters.

4800. (amended) A method of treating a coal formation in situ, comprising:
providing heat from one or more ~~heat source~~heaters to at least a portion of the formation;
allowing the heat to transfer from the one or more ~~heat source~~heaters to a ~~selected section~~part of the formation such that the heat from the one or more ~~heat source~~heaters pyrolyzes at least some hydrocarbons within the ~~selected section~~part of the formation;
producing pyrolysis products from the formation;
heating at least a portion of the ~~selected section~~part of the formation to a temperature sufficient to generate synthesis gas;
controlling a temperature in or proximate to a synthesis gas production well to generate synthesis gas having a selected H₂ to CO ratio;
providing a synthesis gas generating fluid to at least the portion of the ~~selected section~~part of the formation to generate synthesis gas; and
producing synthesis gas from the formation.

4801. (amended) The method of claim 4800, wherein the one or more ~~heat source~~heaters comprise at least two ~~heat source~~heaters, and wherein superposition of heat from at least the two ~~heat source~~heaters pyrolyzes at least some hydrocarbons within the ~~selected section~~part of the formation.

4812. (amended) The method of claim 4800, further comprising allowing the heat to transfer from the one or more ~~heat source~~heaters to the ~~selected section~~part of the formation to substantially uniformly increase a permeability of the ~~selected section~~part of the formation.

4813. (amended) The method of claim 4800, further comprising controlling heat transfer from the one or more ~~heat source~~heaters to produce a permeability within the ~~selected section~~part of the formation of greater than about 100 millidarcy.

4814. (amended) The method of claim 4800, further comprising heating at least the portion of the ~~selected section~~part of the formation when providing the synthesis gas generating fluid to inhibit temperature decrease within the ~~selected section~~part of the formation during synthesis gas generation.

4816. (amended) The method of claim 4800, wherein heating at least the portion of the ~~selected section~~part of the formation to a temperature sufficient to allow synthesis gas generation comprises:

- heating zones adjacent to wellbores of one or more ~~heat source~~heaters with heaters disposed in the wellbores, wherein the heaters are configured to raise temperatures of the zones to temperatures sufficient to support reaction of hydrocarbon material within the zones with an oxidizing fluid;

- introducing the oxidizing fluid to the zones substantially by diffusion;

- allowing the oxidizing fluid to react with at least a portion of the hydrocarbon material within the zones to produce heat in the zones; and

- transferring heat from the zones to the ~~selected section~~part of the formation.

4817. (amended) The method of claim 4800, wherein heating at least the portion of the ~~selected section~~part of the formation to a temperature sufficient to allow synthesis gas generation comprises:

- introducing an oxidizing fluid into the formation through a wellbore;

- transporting the oxidizing fluid substantially by convection into the portion of the ~~selected section~~part of the formation, wherein the portion of the ~~selected section~~part of the formation is at a temperature sufficient to support an oxidation reaction with the oxidizing fluid; and

reacting the oxidizing fluid within the portion of the ~~selected section~~part of the formation to generate heat and raise the temperature of the portion.

4818. (amended) The method of claim 4800, wherein at least one of the one or more heat source heaters comprises an one or more electrical heaters ~~disposed in the formation~~.

4819. (amended) The method of claim 4800, wherein at least one of the one or more heat source heaters comprises ~~one or more~~ a natural distributed combustors.

4820. (amended) The method of claim 4800, wherein the one or more ~~heat source~~heaters comprise one or more heater wells, wherein at least one heater well comprises a conduit disposed within the formation, and further comprising heating the conduit by flowing a hot fluid through the conduit.

4821. (amended) The method of claim 4800, wherein heating at least the portion of the ~~selected section~~part of the formation to a temperature sufficient to allow synthesis gas generation and providing a synthesis gas generating fluid to at least the portion of the ~~selected section~~part of the formation comprises introducing steam into the portion.

4822. (amended) The method of claim 4800, further comprising controlling the heating of at least the portion of ~~selected section~~part of the formation and provision of the synthesis gas generating fluid to maintain a temperature within at least the portion of the ~~selected section~~part of the formation above the temperature sufficient to generate synthesis gas.

4829. (amended) The method of claim 4800, wherein providing the synthesis gas generating fluid to at least the portion of the ~~selected section~~part of the formation comprises raising a water table of the formation to allow water to flow into ~~the~~ at least the portion of the ~~selected section~~part of the formation.

4830. (amended) The method of claim 4800, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers less than 5, and wherein at least a

portion of the hydrocarbons are subjected to a reaction within at least the portion of the ~~selected section~~part of the formation to increase a H₂ concentration within the produced synthesis gas.

4831. (amended) The method of claim 4800, wherein the synthesis gas generating fluid comprises water and hydrocarbons having carbon numbers greater than 4, and wherein at least a portion of the hydrocarbons react within at least the portion of the ~~selected section~~part of the formation to increase an energy content of the produced synthesis gas.

4835. (amended) The method of claim 4800, further comprising using a portion of the synthesis gas as a combustion fuel for the one or more ~~heat source~~heaters.